

Meeting Content

Message from the Division

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Title

The Indiana Gypsy Moth Management Program depends on public participation. Public participation in the management program is necessary because ultimately either gypsy moth infestations or the actions taken to control them will affect the public. To be able to actively participate the Division holds several public meetings in areas where gypsy moth has been detected but is not yet causing damage. When gypsy moth is first detected the public may not be aware that there is a problem, that there will be a problem or what can or is being done to alleviate the problem.

The main purpose of the public meeting is to involve the public in the gypsy moth management process by:

- Providing information about gypsy moth biology
- What damage can the gypsy moth cause?
- How are gypsy moth infestations detected?
- What is Slow the Spread Program?
- What are the options for control?
- What does the DNR propose?

There are several Governmental agencies cooperating in this effort.

- Indiana Department of Natural Resources, Division of Entomology and Plant Pathology – Public Outreach, Regulatory, and Control
- Indiana Department of Natural Resources, Division of Forestry – Survey, Detection, and control
- US Forest Service – Slow the Spread Project Coordination and Control
- USDA Animal and Plant Health Inspection Service – Plant Protection and Quarantine, Eradication
- Purdue University – Public Outreach and Information, Research

The public is encouraged to participate by commenting on how they want proceed with gypsy moth management in their communities.

The Division has many proposals and tools available to assist the communities but it is ultimately the decision of the public that will determine what if any action will be taken. Participation does not end at this meeting. Comments will be received until February 15th when a final decision will need to be made for each location where action is being proposed.

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Objectives

The objectives of the meeting are to provide information on the following:

- Biology
- Damage
- Survey
- Treatment Options
- DNR proposal
- Questions and Comments

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Misconceptions of Gypsy Moth

There are several insect pests, which are confused with Gypsy moth. Several are shown here, including Fall Webworm, Bagworm, and Tent Caterpillars.

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Biology

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Life Stage Preview

Biology – The gypsy moth is an insect that goes through 4 life stage changes: egg, larva, pupa, and adult.

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Egg mass

The egg is laid in late summer and over winters. It hatches in early May in northern Indiana. There are anywhere from 500 – 1000 eggs in an egg mass. Eggs can be laid anywhere.

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Early instar

After they hatch they move to the foliage. If it is crowded they spin a silk thread and balloon or blow to another tree or hilltop. Then they start to feed.

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Ballooning

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Late instar

As they feed they grow. Each growth spurt is called an instar. The male larvae have 5 instars the female have 6. Early instars feed during the day. Late instars feed at night. They crawl down from the foliage and find shelter during the day. The last instar feeds 24 hours. A late instar caterpillar can eat a square foot of leaves in a 24-hour period. They can eat 11 square feet of foliage during their entire caterpillar stage.

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Close up of late instar caterpillar

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Pupae

After eating they change into a pupa. They attach themselves to a stable object to pupate. This can be on a tree trunk or the bumper of your car. They do not spin a cocoon. The pupae are bare except for small, tan hairs.

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Adults

Male moths emerge from their pupal cases first in early July. The females emerge three to five days later. The males have feathery antennae, are dark brown with an inverted V mark pointing to a dot on their wings. Females have similar wing markings but are light in color, are larger, do not have feathery antennae and can't fly. Each female produces a pheromone that attracts the male to her. They mate and she lays eggs in masses.

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She will lay eggs on most anything. The eggs over winter and the cycle starts again.

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Damage

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A pictures of oaks defoliated by gypsy moth larvae.

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Why worry about gypsy moth?

- They are easily distributed naturally and by people.
- Caterpillars have a wide host range – oaks are their favorite.
- Gypsy moth is not native to the United States.
- Only a few of its natural enemies have become established in the United States.
- Populations increase quickly. Each female lays 500 – 1000 eggs half of which may be females.
- They have an environmental impact that can be negative or positive.
- They can adversely affect the health of people and plants.

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Hosts

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Defoliation:

- Reduces a trees ability to produce and store food.
- The tree begins to decline.
- Branches and limbs begin to die.
- The tree becomes more susceptible to attacks from diseases and insects.
- Death may occur after just 2 years of 50% defoliation.

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Forests:

- Decreased vigor and decline of host trees.
- Reduces Timber value.
- Defoliation opens the forest canopy and exposes the forest floor.
- Species composition change occurs when dead trees are replaced by hosts less favored by the gypsy moth.
- Forest floor dries in spring. Seed germination may decline.
- Dead limbs and trees increase the fire load – forest fires spread faster.
- Reduces recreational uses and value.

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Wildlife:

- Hard mast will decrease (acorns, hickory nuts). It will eventually recover but at low levels in a forest where species composition has changed.
- Soft mast will increase. Some wildlife species will utilize soft mast.
- Bird populations fluctuate. An open canopy in spring predisposes nests to predation and parasitism (cow birds).
- Food availability changes – some birds will utilize the gypsy moth caterpillars for food. Others that depend on native caterpillar species for food may disperse to non-defoliated areas.
- Gypsy moths eat the foliage that some native caterpillars utilize thereby reducing the food base for native defoliators. Native butterfly and moth caterpillars may decline.
- Mammal populations will increase or decrease depending on food availability.
- Species may increase or decrease.

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Soil:

- An open canopy exposes soil to sun and rain.
- Soil temperatures increase.
- The soil dries quicker.
- Erodes more readily dependant on slope. Erosion removes valuable nutrients that would help trees survive future defoliations.
- Reduces leaf litter.

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Water:

- Soil washed into streams and lakes increases turbidity.
- Soil in water holds heat longer thereby increasing water temperatures.
- Aquatic weeds may grow faster, die and produce organic matter.
- Nutrient loads from caterpillar excrement, run off and aquatic weeds will reduce oxygen levels in some lakes and ponds.
- Aquatic species diversity will be reduced.
- Some lakes and reservoirs will have more water because of increased runoff.

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Urban Forest: Where trees are already stressed

- Homeowners are liable for fallen limbs, tree removal costs, and replacement costs property values go down.
- Ecological damage.
- Trees cool the air in the summer, block wind, buffer noise, clean the air, and provide homes and shelter for wildlife. If removed these ecological benefits will be lost.

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Larvae

Thousands of crawling, smelling caterpillars.

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Caterpillar hairs

Drifting caterpillar hairs cause some public health concern. There may be skin and respiratory reaction to the irritating hairs.

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Droppings

Their smell and their fecal pellets fall from the trees.

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Surveys

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Survey – Why survey for Gypsy moth?

Several states, along the leading edge of the infestation, trap for the male moths.

Indiana sets traps on a grid system across the entire State.

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There are two types of traps:

- Detection and monitoring.
- They use female sex pheromone to attract a male. The male then gets caught in the trap and is counted.
- Monitoring trap holds 250 moths.
- Detection holds 30.

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Egg mass survey:

Based on trapping survey data we then select sites to look for egg masses. Trapping data, trapping history, egg mass finds or not, host availability, distance to the generally infested area, potential ecological threat all will help determine what we propose as an action.

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By using trapping information we can divide the State into three zones.

- Non infested zone = detection
- Transition zone = Slow the Spread action zone
- Generally infested zone = monitoring zone

Generally infested – Suppression activities Gypsy moth is established and cannot be eradicated. Populations grow and coalesce. Defoliation is noticeable and damage begins to occur after two consecutive years of heavy defoliation. Natural movement (caterpillars ballooning) is frequent. Natural enemies may be present but are not at levels to maintain populations. This area is monitored to evaluate defoliation and outbreaks.

Transition zone – Slow the Spread Action Zone Populations of gypsy moth are small and isolated. They are either caused by caterpillars blowing from the generally infested area or life stages brought in by people. There is no noticeable defoliation. Damage is not evident but imminent. Natural enemies are usually not present but if present would not be in sufficient numbers to prevent damage. This area is trapped to locate populations, determine their size and growth potential. Some type of action is recommended in this area to delay establishment. No action will increase the size of the generally infested area significantly.

Non – infested – Eradication area. No male moths are caught or a few single moths are caught; no populations of gypsy moth have been detected. Natural movement of gypsy moth or effects of defoliation do not immediately threaten this area. Gypsy moths are introduced by human activity not by natural spread. There are no natural enemies in the area that would control gypsy moth. This area is trapped to detect infestations early. If an isolated infestation is found eradication is recommended.

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With slow the spread action and without slow the spread action.

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Treatment Options

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The old way is not always the best way...

Historic pictures of egg mass surveys and treatments.

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Slow the Spread

- Indiana is in the program.
- Though gypsy moth will never be totally eradicated movement can be slowed down.
- New technology is becoming available.
- Slowing gypsy moth allows time for the natural enemies to naturally keep populations down over longer periods without human intervention.

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Gypsy Moth will never be totally eradicated.

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Why Slow the Spread of Gypsy Moth

It allows natural enemies and pathogens to build up. It allows time for new technologies for better control. Slowing the spread conserves our natural resources.

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Natural enemies are

- Predators – eat gypsy moth life stages.
- Pathogens – are bacteria, fungus or virus that utilize gypsy moth for reproduction in the end killing gypsy moth life stages.
- Parasitoids – other insects that reproduce inside gypsy moth life stages eventually kill the host.

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When are Gypsy Moth Treatments Appropriate?

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What are the options?

DNR

- Do nothing.
- Monitor.
- Mechanical mass trapping, burlap, egg mass treatment.
- Use biological pesticides Btk and mating disruption (pheromone flakes).
- Treatment options.

Public

- Do Nothing.
- Mechanical – burlap band.
- Treat egg masses with soybean oil.
- Treat trees with chemical insecticides.
- Treat with biological insecticides.
- The pheromone is not available for public use or application at this time.

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Proposals

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Proposed Action based on site evaluation

- Slow the Spread using mass trapping, Btk., or Pheromone Flakes.
- Mass trap when a few moths are caught in an area and there is no other trapping history.
- Btk when we find high moth catch and other life stages are present.
- Mating disruption (pheromone flakes) high moth catch but no other life stages found.

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Conditions considered when proposing a treatment

- Hosts in the area.
- Distance from the generally infested area.
- Potential ecological threat.

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What is the material we are proposing to use and how is it applied?

***Bacillus thuringiensis* variety *kurstaki* (Btk)** is a natural occurring soil bacteria. When the caterpillar ingests it the Btk forms a crystal in the caterpillars gut. Not all caterpillars are as susceptible as gypsy moth but it only affects caterpillars. It is nontoxic to humans and other mammals and is most efficiently applied from the air.

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Mating disruption (pheromone flakes)

Female sex pheromone is distributed throughout the block before the males emerge. Males emerge first but can't locate a specific female because he can't track a single scent and he gives up. When the females emerge the males won't mate. This only works in low-level populations.

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Security

- Material will be secured before, during, and after the operation.
- The plane will be secured.
- The DNR will have personnel monitoring from the ground and at the airport.

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Questions or Comments?

Gypsy Moth 2007

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Questions?

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Aerial application of Btk